

CLAIMS:

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1. Method of segmenting a three-dimensional structure of interest which is contained in an object from a plurality of two-dimensional images, wherein each of the plurality of images represents a slice of the object, the method
10 comprising the steps of:
 - determining images of the plurality of two-dimensional images with insufficient feature information for the structure of interest;
 - manually drawing attractors in the form at least a partial contour of the structure of interest in the images of the plurality of two-dimensional images; and
15 - segmenting the structure of interest in the plurality of images by using the attractors.
2. Method according to claim 1,
wherein the determination of images of the plurality of two-dimensional images with
20 insufficient feature information for the structure of interest comprises the steps of:
 - segmenting the structure of interest in the plurality of images;
 - identifying the images of the plurality of two-dimensional images with insufficient feature information for the structure of interest on the basis of at least one decision criterion.
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3. Method according to claim 2,
wherein the segmentation of the structure of interest in the plurality of images is based on an adaptation of a deformable model whose surface is formed by a network of meshes which interconnect network points on the surface of the deformable model to
30 the structure of interest; and

wherein the adaptation of the deformable model is based on an iterative optimization of an internal energy based on a distance between the deformable model after adaptation and the deformable model and an external energy based on a distance between the deformable model after adaptation and feature points on the structure of interest.

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4. Method according to claim 1,

wherein the segmentation of the structure of interest in the plurality of images by using the at least partial contour of the structure of interest is based on an adaptation of a deformable model whose surface is formed by a network of meshes which interconnect network points on the surface of the deformable model to the structure of interest; and wherein the adaptation of the deformable model is based on an iterative optimization of an internal energy based on a distance between the deformable model after adaptation and the deformable model and an external energy based on a distance between the deformable model after adaptation and feature points on the structure of interest.

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5. Method according to claim 1,

wherein the manual drawing of attractors in the form of at least a partial contour of the structure of interest in the images of the plurality of two-dimensional images includes an assignment of labels to voxels corresponding to the at least partial contour such that the attractors are considered as strong edges of the structure of interest during segmentation.

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6. Method according to claim 1,

wherein the method is for radiotherapy planning on the basis of CT images.

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7. Image processing device, comprising:

- a memory for storing a plurality of two-dimensional images wherein each of the plurality of images represents a slice of an object;
- a pointer for drawing attractors in the plurality of two-dimensional images; and

- an image processor for segmenting a three-dimensional structure of interest which is contained in the object from the plurality of two-dimensional images, which image processor is adapted to perform the following operation:

- determining images of the plurality of two-dimensional images with insufficient
5 feature information for the structure of interest;
- acquiring attractors manually indicated by a user, wherein the attractors have the form of at least a partial contour of the structure of interest in the images of the plurality of two-dimensional images; and
- segmenting the structure of interest in the plurality of images by using the
10 attractors.

8. Image processing device according to claim 7,
wherein the image processor is further adapted to perform the following operation for
determining images of the plurality of two-dimensional images with insufficient feature
15 information for the structure of interest:

- segmenting the structure of interest in the plurality of images;
- identifying the images of the plurality of two-dimensional images with
insufficient feature information for the structure of interest on the basis of at least one
decision criterion.

20 9. Image processing device according to claim 8,
wherein the image processor is further adapted to perform the segmentation of the
structure of interest in the plurality of images based on an adaptation of a deformable
model whose surface is formed by a network of meshes which interconnect network
25 points on the surface of the deformable model to the structure of interest; and
wherein the image processor is further adapted to perform the adaptation of the
deformable model on the basis of an iterative optimization of an internal energy based
on a distance between the deformable model after adaptation and the deformable model
and an external energy based on a distance between the deformable model after
30 adaptation and feature points on the structure of interest.

10. Image processing device according to claim 7,
wherein the image processor is further adapted to perform the segmentation of the
structure of interest in the plurality of images by using the at least partial contour of the
structure of interest, which segmentation is based on an adaptation of a deformable
5 model whose surface is formed by a network of meshes which interconnect network
points on the surface of the deformable model to the structure of interest; and
wherein the image processor is further adapted to perform the adaptation of the
deformable model on the basis of an iterative optimization of an internal energy based
on a distance between the deformable model after adaptation and the deformable model
10 and an external energy based on a distance between the deformable model after
adaptation and feature points on the structure of interest.

11. Image processing device according to claim 7,
wherein the manual drawing of attractors in the form of at least a partial contour of the
15 structure of interest in the images of the plurality of two-dimensional images by means
of the pointer causes the image processor to perform an assignment of labels to voxels
corresponding to the at least partial contour such that the attractors are considered as
strong edges of the structure of interest during segmentation.

20 12. Image processing device according to claim 7,
wherein the image procession device is one of a radiotherapy planning device, a
radiotherapy device, a workstation, a computer and a personal computer.

13. A computer program for an image processing unit for segmenting a three-
25 dimensional structure of interest which is contained in an object from a plurality of two-
dimensional images, wherein each of the plurality of images represents a slice of the
object, which computer program comprises the steps of:
- determining images of the plurality of two-dimensional images with insufficient
feature information for the structure of interest;

- acquiring attractors manually indicated by a user, wherein the attractors have the form of at least a partial contour of the structure of interest in the images of the plurality of two-dimensional images; and
 - segmenting the structure of interest in the plurality of images by using the
- 5 attractors.